<u>IN THE CLAIMS</u>

Please cancel Claims 7 and 29, without prejudice or disclaimer of subject

matter, and please amend Claims 1, 8-10, 12, 23, 30-32, 34, 45, 48, and 57 as indicated below.

The following is a complete listing of claims and replaces all prior versions and listings of claims

in the present application:

Claim 1 (currently amended): An image processing apparatus comprising:

labeling means for extracting frame image data from moving image data,

segmenting the frame image data into blocks, and respectively assigning, to the blocks, labels in

accordance with feature amounts obtained in units of the blocks;

sequential label set generation means for generating a sequential label set by

arranging the labels assigned by said labeling means in a predetermined block order;

~~sequential label set accumulation means for accumulating the sequential label~~

~~set generated by said sequential label set generation means in connection with the frame image~~

~~data;~~

similarity computation means for computing similarities between the generated

sequential label set and sequential label sets of a previous frame image data group;

scene change detection means for detecting a scene change frame in the

moving image based on the similarities computed by said similarity computation means; and

scene change storage means for storing information of the detected scene

change frame in connection with the frame image data,

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wherein said scene change detection means detects a frame corresponding to the generated sequential label set as the scene change frame, when a plurality of similarities computed by said similarity computation means are less than a predetermined value

wherein said similarity computation means has a penalty table for holding penalty values in correspondence with pairs of label values, acquires penalty values by referring to the penalty table using pairs of label values obtained from a sequential label set of the frame image data of a scene change frame candidate and sequential label sets of the previous frame image data group, and computes the similarities based on the acquired penalty values.

Claim 2 (previously presented): An apparatus according to claim 1, wherein the information of the detected scene change frame includes the number of frames or an elapsed time from the beginning of the moving image to the detected scene change frame.

Claim 3 (previously presented): An apparatus according to claim 1, wherein the labels are unique labels which are given to individual cells obtained by segmenting a multi-dimensional feature amount space into a plurality of cells, and said labeling means computes a feature amount for each block, and assigns to that block a label given to the cell to which the computed feature amount belongs.

Claim 4 (previously presented): An apparatus according to claim 3, wherein the moving image is a color image, the feature amount corresponds to a position of a color

element value in the multi-dimensional feature amount space, and the labels are unique labels given to individual cells obtained by segmenting the multi-dimensional feature amount space into a plurality of cells.

Claim 5 (previously presented): An apparatus according to claim 1, wherein the plurality of blocks are obtained by segmenting an image into a plurality of vertical and horizontal blocks, and the block order used by said sequential label set generation means is an order in which the plurality of blocks are scanned in a horizontal or vertical direction.

Claim 6 (previously presented): An apparatus according to claim 1, wherein said scene change detection means comprises determination means for determining a scene change when the similarity computed by said similarity computation means is not more than a predetermined value.

Claim 7 (canceled)

Claim 8 (currently amended): An apparatus according to claim [[7]] 1, wherein the labels are unique labels which are given to individual cells obtained by segmenting a multi-dimensional feature amount space into a plurality of cells, and the penalty value is a value set based on a distance between cells expressed by two labels.

Claim 9 (currently amended): An apparatus according to claim [[7]] 1, wherein said similarity computation means also gives penalty values representing degrees of similarity of the labels upon computing the similarity between the sequential label set of the frame image data of the scene change frame candidate and the sequential label sets of the previous frame image data group.

Claim 10 (currently amended): An apparatus according to claim [[7]] 1, wherein said similarity computation means computes the similarities by DP matching, using the penalty values.

Claim 11 (previously presented): An apparatus according to claim 10, wherein said similarity computation means further comprises setting means for setting a width of a matching window of DP matching to be used.

Claim 12 (currently amended): ~~An apparatus according to claim 1~~ An image processing apparatus comprising:

labeling means for extracting frame image data from moving image data, segmenting the frame image data into blocks, and respectively assigning, to the blocks, labels in accordance with feature amounts obtained in units of the blocks;

sequential label set generation means for generating a sequential label set by arranging the labels assigned by said labeling means in a predetermined block order, wherein the

sequential label set represents a two-dimensional matrix set~~, and~~;

similarity computation means for computing similarities between the generated sequential label set and sequential label sets of a previous frame image data group, wherein said similarity computation means comprises:

first matching means for corresponding sequential label sets in units of lines extracted from a label matrix of frame image data of a scene change frame candidate, and sequential label sets in units of lines extracted from a label matrix of previous frame image data by DP matching to obtain a line arrangement of the extracted image data; and

second matching means for obtaining a similarity between a line arrangement of the label matrix of the frame image data of the scene change frame candidate and the line arrangement obtained by said first matching means by DP matching;

scene change detection means for detecting a scene change frame in the moving image based on the similarity obtained by said second matching means; and

scene change storage means for storing information of the detected scene change frame in connection with the frame image data.

Claim 13 (previously presented): An apparatus according to claim 12, wherein the sequential label sets in units of lines are each an arrangement corresponding to a horizontal direction of an image.

Claim 14 (previously presented): An apparatus according to claim 12, wherein

the sequential label sets in units of lines is an arrangement corresponding to a vertical direction of an image.

Claim 15 (previously presented): An apparatus according to claim 12, further comprising frame determination means for determining the frame image data of the scene change frame candidate to be scene change frame image data, when the similarity obtained by said second matching means is not more than a predetermined value, and similarities obtained by said second matching means as a result of the same processes for previous frame images are not more than the predetermined value.

Claim 16 (previously presented): An apparatus according to claim 12, wherein said first matching means has a penalty table for holding penalty values in correspondence with pairs of labels, and refers to the penalty table upon computing a distance between a sequential label set of the frame image data of the scene change frame candidate and the sequential label set of the previous frame image data using DP matching.

Claim 17 (previously presented): An apparatus according to claim 12, wherein said second matching means has an inter-line penalty table for holding penalty values in correspondence with pairs of line numbers in the line arrangement, and refers to the inter-line penalty table upon computing similarity between the line arrangement of the frame image data of the scene change frame candidate and the line arrangement of the previous frame image using DP

matching.

Claim 18 (previously presented): An apparatus according to claim 17, further comprising penalty holding means for determining penalty values corresponding to pairs of lines on the basis of similarities of sequential label sets of the frame image data of the scene change frame candidate in the line direction, and holding the determined penalty values as the inter-line penalty table.

Claim 19 (previously presented): An apparatus according to claim 14, wherein said first matching means gives a penalty and constraint upon scaling a sequential label set to be compared when similarity between a label sequence of source image data and a sequential label set stored in said storage means is computed.

Claim 20 (previously presented): An apparatus according to claim 19, wherein the penalty and constraint upon scaling the sequential label set to be compared are acquired on the basis of a theory of DP matching.

Claim 21 (previously presented): An apparatus according to claim 12, further comprising first matching window setting means for setting a width of a matching window of DP matching used by said first matching means.

Claim 22 (previously presented): An apparatus according to claim 12, further comprising second matching window setting means for setting a width of a matching window of DP matching used by said second matching means.

Claim 23 (currently amended): A scene change detection method comprising the steps of:

extracting frame image data from moving image data, segmenting the frame image data into blocks, and respectively assigning, to the blocks, labels in accordance with feature amounts obtained in units of blocks;

generating a sequential label set by arranging the assigned labels in a predetermined block order;

computing similarities between the generated sequential label set and sequential label sets of a previous frame image data group; and

detecting a scene change frame in the moving image based on the computed similarities, ~~wherein a frame corresponding to the generated sequential label set is detected as the scene change frame, when a plurality of similarities computed at said computing step are less than a predetermined value~~

wherein said similarity computation step uses a penalty table for holding penalty values in correspondence with pairs of label values, and includes the steps of acquiring penalty values by referring to the penalty table using pairs of label values obtained from a sequential label set of the frame image data of a scene change frame candidate and sequential

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label sets of the previous frame image data group, and computing the similarities based on the acquired penalty values.

Claim 24 (previously presented): A method according to claim 23, wherein information of the detected scene change frame includes the number of frames or an elapsed time from the beginning of the moving image to the detected scene change frame.

Claim 25 (previously presented): A method according to claim 23, wherein the labels are unique labels which are given to individual cells obtained by segmenting a multi-dimensional feature amount space into a plurality of cells, and said extracting and assigning step includes the step of computing a feature amount for each block, and assigning to that block a label given to the cell to which the computed feature amount belongs.

Claim 26 (previously presented): A method according to claim 25, wherein the moving image is a color image, the feature amount corresponds to a position of a color element value in the multi-dimensional feature amount space, and the labels are unique labels given to cells obtained by segmenting the multi-dimensional feature amount space into a plurality of cells.

Claim 27 (previously presented): A method according to claim 23, wherein the plurality of blocks are obtained by segmenting an image into a plurality of vertical and horizontal blocks, and the block order used in said sequential label set generating step is an order in which

the plurality of blocks are scanned in a horizontal or vertical direction.

Claim 28 (previously presented): A method according to claim 23, wherein said scene change detecting step includes the step of determining a scene change when the similarity computed in said similarity computing step is not more than a predetermined value.

Claim 29 (canceled)

Claim 30 (currently amended): A method according to claim [[29]] 23, wherein the labels are unique labels which are given to individual cells obtained by segmenting a multi-dimensional feature amount space into a plurality of cells, and the penalty value is a value set based on a distance between cells expressed by two labels.

Claim 31 (currently amended): A method according to claim [[29]] 23, wherein said similarity computation step includes the step of also giving penalty values representing degrees of similarity of the labels upon computing the similarity between the sequential label set of the frame image data of the scene change frame candidate and the sequential label sets of the previous frame image data group.

Claim 32 (currently amended): A method according to claim [[29]] 23, wherein said similarity computation step includes the step of computing the similarities by DP

matching, using the penalty values.

Claim 33 (previously presented): A method according to claim 32, wherein said similarity computing step includes the step of setting a width of a matching window of DP matching to be used.

Claim 34 (currently amended): ~~A method according to claim 23~~ A scene change detection method comprising the steps of:

extracting frame image data from moving image data, segmenting the frame image data into blocks, and respectively assigning, to the blocks, labels in accordance with feature amounts obtained in units of the blocks;

generating a sequential label set by arranging the assigned labels in a predetermined block order;

computing similarities between the generated sequential label set and sequential label sets of a previous frame image data group; and

detecting a scene change frame in the moving image based on the computed similarities,

wherein the sequential label set represents a two-dimensional matrix set, and said similarity computation step includes:

a first matching step, of corresponding sequential label sets in units of lines extracted from a label matrix of frame image data of a scene change frame candidate, and

sequential label sets in units of lines extracted from a label matrix of previous frame image data

by DP matching to obtain a line arrangement of the extracted image data; and

a second matching step, of obtaining a similarity between a line

arrangement of the label matrix of the frame image data of the scene change frame candidate, and

the line arrangement obtained by said first matching means by DP matching.

Claim 35 (previously presented): A method according to claim 34, wherein the

sequential label sets in units of lines are each an arrangement corresponding to a horizontal

direction of an image.

Claim 36 (previously presented): A method according to claim 34, wherein the

sequential label sets in units of lines are each an arrangement corresponding to a vertical

direction of an image.

Claim 37 (previously presented): A method according to claim 34, wherein the

frame image data of the scene change frame candidate is determined to be scene change frame

image data, when the similarity obtained in said second matching step is not more than a

predetermined value, and similarities obtained in said second matching step as a result of the

same processes for previous frame images are not more than the predetermined value.

Claim 38 (previously presented): A method according to claim 34, wherein

said first matching step uses a penalty table for holding penalty values in correspondence with pairs of labels, and includes the step of referring to the penalty table upon computing a distance between a sequential label set of the frame image data of the scene change frame candidate and the sequential label set of the previous frame image data using DP matching.

Claim 39 (previously presented): A method according to claim 34, wherein said second matching step uses an inter-line penalty table for holding penalty values in correspondence with pairs of line numbers in the line arrangement, and includes the step of referring to the inter-line penalty table upon computing similarity between the line arrangement of the frame image data of the scene change frame candidate and the line arrangement of the previous frame image using DP matching.

Claim 40 (previously presented): A method according to claim 39, wherein penalty values corresponding to pairs of lines are determined on the basis of similarities of sequential label sets of the frame image data of the scene change frame candidate in the line direction, and the determined penalty values are held as the inter-line penalty table.

Claim 41 (previously presented): A method according to claim 36, wherein said first matching step includes the step of giving a penalty and constraint upon scaling a sequential label set to be compared when similarity between a sequential label set of source image data and a sequential label set stored in storage means is computed.

Claim 42 (previously presented): A method according to claim 41, wherein the penalty and constraint upon scaling the sequential label set to be compared are acquired on the basis of a theory of DP matching.

Claim 43 (previously presented): A method according to claim 34, wherein a width of a matching window of DP matching used in said first matching step is set.

Claim 44 (previously presented): A method according to claim 34, wherein a width of a matching window of DP matching used in said second matching step is set.

Claim 45 (currently amended): A storage medium for storing a control program for making a computer execute a scene change detection method, said method comprising the steps of:

extracting frame image data from moving image data, segmenting the frame image data into blocks, and respectively assigning, to the blocks, labels in accordance with feature amounts obtained in units of blocks;

generating a sequential label set by arranging the assigned labels in a predetermined block order;

computing similarities between the generated sequential label set and sequential label sets of a previous frame image data group; and

detecting a scene change frame in the moving image based on the computed

similarities, ~~wherein a frame corresponding to the generated sequential label set is detected as the scene change frame, when a plurality of similarities computed at said computing step are less than a predetermined value~~

wherein said similarity computation step uses a penalty table for holding penalty values in correspondence with pairs of label values, and includes the steps of acquiring penalty values by referring to the penalty table using pairs of label values obtained from a sequential label set of the frame image data of a scene change frame candidate and sequential label sets of the previous frame image data group, and computing the similarities base on the acquired penalty values.

Claim 46 (previously presented): A medium according to claim 45, wherein the labels are unique labels which are given to individual cells obtained by segmenting a multi-dimensional feature amount space into a plurality of cells, and said extracting and assigning step includes the step of computing a feature amount for each block, and assigning to that block a label given to the cell to which the computed feature amount belongs.

Claim 47 (previously presented): A medium according to claim 45, wherein said similarity computing step includes the step of computing the similarities by DP matching using penalty values.

Claim 48 (currently amended): ~~A medium according to claim 45~~ A storage

medium storing a control program for making a computer execute a scene change detection

method, wherein the method comprises the steps of:

extracting frame image data from moving image data, segmenting the frame

image data into blocks, and respectively assigning, to the blocks, labels in accordance with

feature amounts obtained in units of blocks;

generating a sequential label set by arranging the assigned labels in a

predetermined block order;

computing similarities between the generated sequential label set and

sequential label sets of a previous frame image data group; and

detecting a scene change frame in the moving image based on the computed

similarities,

wherein the sequential label set represents a two-dimensional matrix set, and

said similarity computing step includes:

a first matching step, of corresponding sequential label sets in units of

lines extracted from a label matrix of frame image data of a scene change frame candidate, and

sequential label sets in units of lines extracted from a label matrix of previous frame image data

by DP matching to obtain a line arrangement of the extracted image data; and

a second matching step, of obtaining a similarity between a line

arrangement of the label matrix of the frame image data of the scene change frame candidate, and

the line arrangement obtained by said first matching means by DP matching.

Claim 49 (previously presented): A medium according to claim 48, wherein the frame image data of the scene change frame candidate is determined to be scene change frame image data, when the similarity obtained in said second matching step becomes not more than a predetermined value, and similarities obtained in said second matching step as a result of the same processes for previous frame images become not more than the predetermined value.

Claim 50 (previously presented): A medium according to claim 48, wherein said first matching step uses a penalty table for holding penalty values in correspondence with pairs of labels, and includes the step of referring to the penalty table upon computing a distance between a sequential label set of the frame image data of the scene change frame candidate and the sequential label set of the previous frame image data using DP matching.

Claim 51 (previously presented): A medium according to claim 48, wherein said second matching step uses an inter-line penalty table for holding penalty values in correspondence with pairs of line numbers in the line arrangement, and includes the step of referring to the inter-line penalty table upon computing similarity between the line arrangement of the frame image data of the scene change frame candidate and the line arrangement of the previous frame image using DP matching.

Claim 52 (previously presented): A medium according to claim 45, wherein said control program further includes the step of determining penalty values corresponding to

pairs of lines on the basis of similarities of sequential label sets of the frame image data of the scene change frame candidate in the line direction, and holding the determined penalty values as the inter-line penalty table.

Claim 53 (previously presented): A medium according to claim 48, wherein a first matching step includes the step of giving a penalty and constraint upon scaling a sequential label set to be compared when similarity between a label sequence of source image data and a sequential label set stored in storage means is computed.

Claim 54 (previously presented): A medium according to claim 48, wherein said first matching step and/or said second matching step include/includes the step of setting a width of a matching window of DP matching used.

Claim 55 (previously presented): An apparatus according to claim 11, wherein when said apparatus is equipped in a movie, the width of a matching window is changed in accordance with a mount of shaking detected by a sensor.

Claim 56 (previously presented): A method according to claim 33, wherein in a movie, the width of a matching window is changed in accordance with a mount of shaking detected by a sensor.

Claim 57 (currently amended): A medium according to claim 45, wherein, in a movie, the width of a matching window is changed in accordance with a mount of shaking detected by a sensor.